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### COCKPIT STUDY OF AT-17 TYPE AIRPLANE

This general outline will be elaborated upon in ground school. Each operating unit of the AT-17 type airplane will be thoroughly discussed and gone over. The cockpit study must be comprised of ten (10) hours. At least five (5) hours before flight and the remainder after flight. Instructor or crew chief will instruct the student.

Before flight the student must read and be familiar with everything discussed in this pamphlet and in addition be able to:

1. Trace the fuel system from gauge to engine, explaining:
  - a. Type of gauge--its accuracy.
  - b. Number of tanks, capacities, and reserve. *2-60 gal, no reserve*
  - c. Tank selector valve.
  - d. Cross-feed valve.
  - e. Engine selector valve.
  - f. Carburetor heat control.
  - g. Mixture Control. *check cyl. head temp.*
2. Trace the electrical system, magnetoes and battery, explaining:
  - a. Number of magnetoes.
  - b. Magneto switches.
  - c. Battery mainline system.
  - d. Generators, ammeter and voltmeter.
  - e. Fuses and changing procedure.
3. Know fuel and oil consumption of engine per hour.  
*Max 17.5 gal/hr normal 13.9-14.2 gal/hr*
4. Know the safe operation range of the fuel pressure, oil pressure, oil temperature and cylinder head temperature gauge of each engine.
5. Demonstrate the use of fletners and fletner trim tabs.
  - a. Elevator
  - b. Rudder
6. Demonstrate the use of flaps.
7. Show the mechanics of the electrically operated retractable landing gear, stating its limitations and reliability. Know all warning devices, safety devices and explain emergency procedure for lowering.
8. Explain the constant speed propeller.
9. Explain the manifold pressure gauge.
10. Explain the tail-wheel lock.



11. Explain the radio, operation, interphone procedure, coil changing procedure.
12. Know the use of the wheel control column, and possible danger to beginners.
13. Know the location and use of every control, instrument, gauge, switch and lever in the cockpit. Being able to explain the principle upon which each operates.

### GENERAL INSTRUCTIONS

#### A. LOCATION OF CONTROLS

##### 1. Flight controls

- (a) Rudder pedals and control columns, conventional location.
- (b) Elevator trim tabs  
One hand crank, located on pilots compartment ceiling.
- (c) Rudder trim tab  
One crank, located on pilots compartment ceiling.
- (d) Aileron trim tabs  
No manual control fixed (ground adjustable)
- (e) Flaps  
Switch on instrument panel.

##### 2. Landing Gear Controls

- (a) Wheel retracting switch on instrument panel.
- (b) Parking Brake  
Hand lever on left side of pilot
- (c) Tail Wheel Lock  
Center rear of pilots compartment ceiling.
- (d) Landing Gear manual crank  
Under pilot's seat.

##### 3. POWER PLANT CONTROLS

- (a) Throttles  
On left of control pedestal head.
- (b) Propeller Pitch  
On right of control pedestal head.
- (c) Mixture  
On aft side of control pedestal.



- (d) Carburetor Heat  
On aft side of control pedestal.
- (e) Primer  
Left side of instrument panel.
- (f) Cross Feed Valve Dial  
Between pilot's seats.
- (g) Fuel Selector Valve Dial  
Between pilot's seats.
- (h) Engine Selector Valve Dial  
Between pilot's seats.
- (i) Wobble Pump  
Between pilot's seats.
- (j) Starter Switches  
Right side of instrument panel.
- (k) Ignition switches  
Right lower side of instrument panel.
- (l) Oil Temperature  
On ~~left~~ and right side of control pedestal.
- (m) Friction Control Knob  
On left side of control pedestal.
- (n) Oil Dilution Switches  
Left side of instrument panel.

#### 4. Other Controls:

- (a) Rudder Pedal Adjustment  
Levers on each rudder pedal hanger above the pedals.
- (b) Pilot's seat Fore and Aft Adjustment--left side of seat.
- (c) Co-pilot's Seat Fore and Aft Adjustment--right side of seat.
- (d) Electrical panel containing miscellaneous electrical switches--Left center of instrument panel.
- (e) Command Set Receiver--at rear wall of cabin on shelf.
- (f) Command Set Tuning--left sidewall of pilot's compartment.
- (g) Command Set Remote Hi-Low--left sidewall of pilot's compartment.

## B. OPERATION OF CONTROLS

### 1. Flight Controls.

- (a) General: Operation of the wheel control and rudder pedals is conventional.



pedals is conventional.

- (b) Elevator Tabs - Turn crank clockwise for nose up.

- (c) Rudder Tabs - Turn crank clockwise for nose right.

- (d) Flaps

- (1) Normal Operation

To lower flaps, push switch to "Down" position. Return switch to center position when position indicator shows that the flaps are at the desired position. Do not raise flaps until sufficient altitude has been gained to clear any obstacle. Refer to T.O. No. 01-I-16

## 2. Landing Gear Controls

- (a) Normal Operation

- (1) To Retract: Move switch to "UP" position. Position indicator will show when wheels are fully up. The landing gear switch is to be left in the "UP" position following the retracting operation.

- (b) Emergency Operation

- (1) Should the wheels fail to come up, check fuse. If the fuse is intact, return switch to center, remove hand crank from clip on floor, insert in socket at right side of pilot's seat, and wind gear up manually until indicator shows gear fully retracted.

- (c) Normal Operation

- (1) To Extend: Move landing gear switch to "DOWN" position. Position indicator will show when wheels are fully down. The landing gear switch is to be left in "DOWN" position after the gear is fully extended.

- (2) Emergency Extension

Should the gear fail to extend fully, check fuse. If fuse is intact, place landing gear switch in neutral position, remove hand crank from clip, fit into socket on right of pilot's seat, and extend gear manually by cranking. Manual operation of landing gear crank must not be attempted unless landing gear switch is in neutral position. (191 Turns).

- (3) Tail Wheel Centering Lock

Down movement of control to "LOCK" position locks the tail wheel in trailing position for Take-Off and Landing. Upward movement of the control to "UNLOCK" position releases the tail wheel allowing 360 degrees rotation.

- (4) Parking Brakes

Lever on left side of pilot's compartment should be pulled aft until it latches to set brakes.



### 3. Power Plant Controls

#### (a) Engines

For general engine operation instructions, refer to T.O. No. 02-30AC-1.

#### (1) Starting - When starting both engines, start left engine first.

1. Set L. H. fuel selector on LEFT.
2. Cross Feed valve control OFF.
3. Propeller control in FIXED HIGH PITCH position.
4. Carburetor air temperature controls at COLD.
5. Throttle about one-tenth open, equivalent to 600-800 R.P.M.
6. Mixture control at RICH.
7. Main line switch ON.
8. Battery ignition switch for engine being started ON.
9. Raise fuel pressure slowly to 2 or 3 pounds per square inch with wobble pump.
10. Prime engine being started with external hand primer approximately 5 strokes. When starting warm engine, primer need not be used, but to provide the correct fuel-air mixture ratio, it may be necessary to open the throttle slightly beyond the cold engine starting position.
11. Operate starter. (When a cold engine is being started for the first time, it will stand considerable priming without overloading. However, the primer should be used sparingly if the engine fails to start the first time. The throttle should never be pumped since an extreme fire hazard may result).
12. When engine starts, turn magneto ignition switch to ON.
13. Immediately note if oil pressure reads a minimum of 60 lbs. Do not take-off until oil pressure gage shows a normal reading which should be from 70 to 90 lbs. Pressure should be so adjusted as to never exceed 100 lbs.

#### (2) Cold Starting Technique

1. If temperature is below freezing, additional priming will probably be required. It is O.K. to use up to



10 strokes before attempting to start the engine and will be an advantage if the strokes can be pumped to the engine while it is being turned over by hand with throttles completely closed.

2. Engine "kicking back" during starting is a sure sign of a lean mixture. Stop starting operation, prime several more shots and proceed as before. During exceptionally cold weather, the primer should be unlocked, turned to the engine being started and the mechanic or pilot prepared to keep the engine running with short strokes of the primer. DO NOT PUMP THE THROTTLES. *ice up easily*
3. Jacobs engines are exceptionally good starters. If the engine does not start after 4 or 5 revolutions, stop and look things over to see what is wrong. When in doubt, give the engine 2 or 3 more good strokes on the primer and try again. If in cold weather, the engine starts, turns a few revolutions and stops, it is an indication that it will be necessary to use the primer to keep the engine running as instructed above.
4. After the left engine is started and warmed up enough to idle smoothly, proceed with starting the right engine in the same manner. If the right engine doesn't start readily after the left engine is warmed up enough so it will not hurt it to turn up 1400 or so, advance its idling speed slowly watching the ammeter to get maximum output and then attempt starting the right engine with the left engine running at this speed where the generator will assist considerably in making hotter sparks and turning the right engine faster.

(3) Taxiing:

1. Use both throttles evenly to get the airplane started rolling forward.
2. Control wheel to be kept in neutral position which is the best compromise for all wind conditions and will save confusion.
3. Use the tail wheel lock when there is a long straight distance to cover.
4. For ground operation, when taxiing a long ways in cross wind, it will sometimes help to have one engine completely throttled back and the other one on just enough to maintain the desired taxiing speed, which will help overcome the tendency of the wind to swing the airplane around on the ground. However, in making turns, power should be kept well back. Never taxi above normal walking speed.



5. AT-17 brakes heat easily and rapidly. The heat dissipates to the tires and is very apt to cause a blowout. Extreme care will be employed to use the brakes as little as possible. Use the outside engine for a turn, not the brakes. DO NOT DRAG THE BRAKES!

(4) Ground Run-Ups:

1. Jacobs engines have very severe carburetor icing characteristics. For this reason, full carburetor heat is recommended for normal warm-up and taxiing. Carburetor heat will NOT be used when starting or stopping engines or for take-off.
2. For high speed checks or R.P.M.'s, battery ignition and magneto ignition: Carburetor heat FULL COLD.
3. Due to the extremely low capacity of the battery in this airplane, it shall be used only for emergency starting operation and never for prolong radio or landing gear checks. During such operations, or for cold early morning starts, an auxiliary battery in a battery cart shall be used to provide power at the cannon plug receptacle.
4. Engines will not be warmed up in excess of 1000 R.P.M.

(5) Stopping

1. Before the engine is stopped, place propeller control in POSITIVE HIGH PITCH POSITION and run engine at 1200 R.P.M. until blades have shifted; idle until the engine has cooled appreciably below cruising temperature.
2. Throttles to FULL IDLE (Back) position.
3. Mixture control levers to LEAN position.
4. Turn ignition switches to OFF after the engine ceases firing.
5. Turn master switch OFF.

NOTE: When OIL DILUTION SYSTEM is to be used: While idling 800-1000 R.P.M., hold dilution switch in ON position for three to five minutes, length of time depending upon temperature anticipated when engines are to be started.

(b) PROPELLERS

(1) General

1. Complete operation for propeller and governor are contained in T.O. Nos. 03-20CA-1 and 03-20CB-1.



## 2. Propeller Pitch Controls:

- (a) General: Forward movement of the propeller pitch control levers to TAKE-OFF (low-pitch) position increases engine R.P.M., aft movement to POSITIVE HIGH PITCH position reduces R.P.M.
- (b) For Take-Off: Set controls to TAKE-OFF position.
- (c) During Flight: Set controls to obtain desired R.P.M.
- (d) For Landing: Set controls to TAKE-OFF position.
- (e) Single-Engine Flight: Place propeller pitch control of operating engine in TAKE-OFF position and that of dead engine in POSITIVE HIGH PITCH POSITION. When restarting dead engine, warm up at approximately 1100 R.P.M., gradually advancing throttles and propeller controls to operating position.

## (c) Fuel System:

- (1) General--Refer to fuel system diagrams in back of text.
- (2) Fuel Selectors:

Two fuel selector controls are provided. To supply both engines from the L. H. tank, set the fuel tank selector valve in the LEFT position, set engine selector valve for both.

## (3) Cross-Feed

Set control to "OFF" for pressure check, flight and starting engines; to "ON" for take-off and landing. In case of pump failure, set cross-feed to "ON" and in the event of line failure or fire, set control to "OFF".

## (4) Wobble Pump:

The wobble pump handle should be operated slowly and smoothly. When fuel pressure failure occurs, use wobble pump immediately and then attempt to locate trouble.

## (5) Operation in case of fuel system failure:

- (1) Fuel Pump Failure--Either Engine: If fuel pressure drops on one engine, turn cross-feed valve control ON. If pressure comes up, fuel pump failure on one engine is indicated. In this event, cross-feed valve control should be left ON, which will permit the engine fuel pump which is operating satisfactorily to supply fuel to both engines.

## (2) Fuel Pump Relief Valve or Fuel Line Failure, Either Engine:



If fuel pressure drops on either engine, turn cross-feed valve control ON. If pressure fails to come up to proper indication, fuel pump relief valve or fuel line failure is indicated. In this event, turn cross-feed valve OFF, and operate with single engine following the instructions in T.O. #01-1-17.

(3) Fuel Pump Failure, Both Engines:

If fuel pressure drops in both engines, turn cross-feed valve control ON and operate Wobble Pump.

(d) Starter Switch:

- (1) A three position switch is provided for engine starting. In starting the left engine, the switch is held in the LEFT position. In starting the right engine, the switch is held in the RIGHT position. Switch will return to the center, neutral position, when released.

(e) Mixture (M):

- (1) Move mixture lever down for rich mixture and up for lean.

(f) Carburetor Air Temperature (C):

- (1) Move control lever down for cold and up for hot. In normal operation, carburetor air is COLD.

(g) Oil temperature controls are located on either side of the control quadrant.

- (1) By pulling out on the control, heat is admitted to oil heater.

4. OTHER CONTROLS:

(a) Heating and Ventilating:

Turning control on top of pilot's compartment increases or decreases the amount of air at outside temperature admitted to the cabin. The control may be set as desired. Pulling up control at outboard side of seat increases cabin temperature.

(b) Command Set:

Set receiver control switch to AUTO or to MANUAL in case radio range reception is desired. Adjust volume control to as low a setting as practicable so as to avoid overloading the receiver with probable reversal of the radio range courses. Set the transmitter control switch to VOICE. Tune transmit by voice, press microphone button and speak normally into the microphone.



(c) Seat Adjustment:

To adjust in horizontal direction, pull back on adjustment handle to release plungers, move seat to desired position, release handle and see that plungers are again properly seated. To adjust vertically, release catch by pulling back on handle on right side of seat and vary weight on seat.

(d) Miscellaneous Electrical Controls:

(1) Switches and Operations

- (1) Operation of switches are obvious and require no comment.
- (2) Generator switches (one for each engine) should be left in the "ON" position at all times.
- (3) The battery switch controls all battery operated circuits, and should be turned OFF before leaving the airplane.
- (4) Landing Light Switch--Placing the landing light switch in the "ON" position causes the corresponding retractable landing light to swing downward and out of the wing. The Lamp goes "ON" automatically after passing the centerline of the pivot. Placing the switch in the "Retract" position causes the light to retract and the lamp to go out.

CAUTION: Avoid burning landing lights longer than three minutes.

(5) Fuse Box

If any electrical failure is present, open lid of "Fuse Box" and examine the specific fuse for "Burned Out" condition. If fuse is burned out, replace with spare fuse.

(e) RADIO CONTROLS

(1) Receiving

- (1) Place headset plug in the telephone jacket from control box.
- (2) Turn control switch to "Manual".
- (3) Turn control box knob to "Voice".
- (4) Turn filter box control knob to "Both", "Voice" or "Range".
- (5) Adjust "Hi-Lo" switch to desired frequency band.
- (6) Adjust "Frequency control" to desired frequency.
- (7) Adjust volume.



# FLYING PROCEDURE OF AT-17 TYPE AIRPLANE

## a. BEFORE TAKE-OFF

1. Read Form 1A.
2. Sign Exceptional Release if on red diagonal--must be by an officer.
3. Fill out clearance.
4. Put on parachute
5. Fasten safety belt
6. Adjust seat and rudder pedals
7. Start engine by check-list
  - (1) Pitot tube cover removed.
  - (2) Wheel shocks in place
  - (3) Check for free movement of flight controls.
  - (4) Altimeter Set.
  - (5) Vacuum selector switch on static
  - (6) Parking brake on
  - (7) Flttners tuned for take-off
    - a. Elevators
    - b. Rudders
  - (8) Main line (master battery) switch on
  - (9) Landing gear toggle switch in down position
  - (10) Flaps in up position
  - (11) Generators on
  - (12) Propeller in high pitch, low R.P.M.
  - (13) Tank selector on left tank (fullest)
  - (14) Engine selector on both
  - (15) Cross feed off
  - (16) Mixture control full rich
  - (17) Carburetor heat cold
  - (18) Prime each engine five (5) full primes. Turn primer to off
  - (19) Turn battery ignition on
  - (20) Wobble up 2 to 3 pounds of fuel pressure
  - (21) Call "Clear" before starting each engine and wait for reply of "Clear".
  - (22) Start each engine.
  - (23) Turn on magneto switches.
  - (24) Push props into low pitch, high R.P.M., after obtaining 60 pounds of oil pressure in each of the respective engines.
  - (25) Uncage and set gyro compass
  - (26) Uncage gyro horizon  $3\frac{1}{2}-4$
  - (27) Check vacuum pressure (8 pounds)
  - (28) Check voltmeter and ammeter
  - (29) Check all electric instruments for proper readings:
    - a. Oil pressure 70-90 lbs./sq. in.
    - b. Fuel pressure  $3\frac{1}{4}-3\frac{1}{2}$  lbs./sq. in.
    - c. Oil Temperature  $40^{\circ} - 80^{\circ} C$
    - d. Cylinder head temperature  $150^{\circ} C - 205^{\circ} C$
    - e. Fuel Air ratio ~~0.075~~ - 0.076
  - (30) Turn cross-feed on
  - (31) Release hand brake
8. Turn on radio
9. Tune in tower
10. Adjust volume
11. Call tower by abbreviated form
  - a. "Five (5) G.B. from Army 2213 (the army serial # of the airplane) request take-off instructions, go ahead"
  - b. "Army 2213 from five (5) G.B., taxi out and take-off on  $140^{\circ}$
  - c. runway go ahead"

CALL:

"Clear" before starting each engine.



12. Check magnetoes with cross-feed "Off"
  - a. Run engines up to 1500 RPM
  - b. Keep head up, only glance down with eyes whenever engines are running, always keep horizon in view.
13. Fasten doors securely

b. TAXIING (LOOK AROUND)

1. Taxi cautiously
2. Taxi with throttles
3. Taxi with a minimum of brakes
4. Taxi slowly enough so the airplane could be stopped or ground-looped safely in case of brake failure.
5. Run-up engines occasionally while taxiing.
6. Slow taxiing must be a compromise between throttles blasts and the use of brakes.
7. Use tail-wheel lock only for long stretches.
8. Call for "Clear on the right" at desirable times, Co-Pilot responds with "Clear" if so.
9. Check cockpit and airplane for take-off
 

<ol style="list-style-type: none"> <li>a. Check gasoline by:               <ol style="list-style-type: none"> <li>1. Gauges</li> <li>2. Turning tank selector valve to LEFT or fullest tank.</li> <li>3. Cross-feed "On"</li> <li>4. Selector valve on "Both"</li> <li>5. Putting mixture controls in "Full Rich"</li> <li>6. Putting carburetor heat on "Cold"</li> </ol> </li> <li>b. Check electrical system               <ol style="list-style-type: none"> <li>1. Battery switch "On"</li> <li>2. Electrical instruments--OK</li> <li>3. Generators "On"</li> </ol> </li> <li>c. Check engine instruments by               <ol style="list-style-type: none"> <li>1. Numerical range</li> <li>2. Green and red ranges</li> <li>3. Comparing like gauges of each engine</li> </ol> </li> <li>d. Check Flttnrs               <ol style="list-style-type: none"> <li>1. Flaps in up position</li> <li>2. Elevator trim tab neutral</li> <li>3. Rudder trim tab neutral</li> </ol> </li> <li>e. Props in full high RPM</li> </ol>	<p style="text-align: center;">CALL OUT</p> <ol style="list-style-type: none"> <li>a' 1. "On fullest tank with (X) gallons"</li> <li>2. "Cross-feed On"</li> <li>3. Selector on Both"</li> <li>4. Mixt. controls Full Rich"</li> <li>5. "Carb. heat Cold"</li> <li>b' 1. "Mags, OK"</li> <li>2. "Generator On"</li> <li>c' 1. "Engine instruments check OK"</li> <li>d' 1. "Flaps Up"</li> <li>2. "Elevators trimmed"</li> <li>e' 1. "Props forward"</li> </ol>
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10. Prepare for immediate take-off when runway is clear
11. Taxi into take-off position.
12. Taxi straight ahead for 20' before locking tail-wheel.

c. TAKE-OFF (LOOK AROUND)

1. Apply throttles evenly and smoothly. (Save cross-wind; advance wind-ward throttle to compensate)
2. Set manifold pressure at 25"
3. Set props in Full High RPM
4. Leave tail on ground until sufficient rudder control is present
5. Raise tail in a positive movement.
6. Keep wheels on the ground until sufficient airspeed is obtained (70 to 75 MPH)
7. Keep airplane straight with rudders, use brakes only when necessary.
8. Fly off the ground at 70 to 75 MPH, level-off low.



9. Retract landing gear
10. Adjust throttles to climbing manifold pressure (23")
11. Pull props back to climbing RPM (2000)
12. Check engine instruments.
13. Reset throttles accurately
14. Reset and synchronize props
15. Adjust elevator trim tab
16. Climb at 110 MPH
17. Climb straight ahead until properly spaced.
18. Make 90° turn onto leg to leave traffic and leave at 45° or make 90° turn and climb to altitude of traffic pattern (1200)
19. Make 90° turn onto down wind leg, not over two (2) miles from the runway

d. CRUISING (LOOK AROUND)

1. Adjust throttles for cruising (20)
2. Adjust props for cruising (1850 RPM)
3. Adjust elevator and rudder trim tabs of level and straight flight. "Hands off" flight.
4. Adjust mixture controls for smooth engine operation .076
5. Check for ice in carburetor with Carb. Heat.
6. Check engine instruments periodically (15 minute intervals)
7. Keep airspeed below red line on indicator (180 MPH)
8. Make no violent maneuvers--definitely no acrobatics

e. LANDING (LOOK AROUND)

1. Call tower for landing instructions by abbreviated form:
  - a. "Five G.B. from Army 2214 (the army serial number of the airplane), request landing instructions, Go ahead".
  - b. "Army 2214 from five (5) G.B. land on 180° runway, Go ahead"
  - c. "Five (5) G.B. from Army 2214, Wilco"
2. Enter traffic on up-wind end of down wind leg
3. Enter at 45° and fly 120 MPH in the traffic pattern
4. Space airplane with relation to traffic here
5. Opposite spot of landing
  - a. Placing landing gear switch in "Down" position CALL OUT
    - b' 1. "Wheels down & locked"
  - b. Check position of landing gear by
    1. Autosyn Indicator
    2. Attitude of airplane
    3. Visual check by looking out windows
    4. Audibly by the horn
  - c. Check gasoline by:
    - c' 1. "On fullest tank with (X) gallons".
    2. Turning tank selector valve to 2. Mixture control Full Rich" fullest tank
    3. Putting mixture controls in 3. "Carb. Heat Cold" full rich
    4. Putting carburetor heat on cold
  - d. Check engine instruments by:
    - d' 1. "Engine Inst. check OK"
    1. Numerical range
    2. Green and red range
    3. Comparing like gauges of each engine
6. Make 90° turn onto base leg not over two (2) miles from runway
7. Make 90° turn onto approach leg.
8. Push prop pitches forward immediately after turn onto approach leg, maximum cruising RPM (2000)



9. Establish gliding speed (90 MPH).
10. Lose altitude at a constant rate, not over 1000' per minute
11. Use desired amount of flaps above 500'.
12. Turn elevator so that the pilot must hold some back pressure
13. Correct drift by:
  - a. Dropping a wing into the wind
  - b. Crabbing into the wind
  - c. A combination of the two above.
14. Land in the first 1/3 of the runway or go around
15. If runway is obstructed or closed, go around
  - a. Go around procedure:
    1. Apply 25" of manifold pressure or more if needed
    2. Simultaneously with (a) above push the nose down
    3. Retract the landing gear
    4. Push props to climbing RPM (2000)
    5. Trim elevator
    6. Raise flaps *above 300'*
16. Have the longitudinal axis of the airplane parallel with the runway when the wheels touch.
17. Have ~~no~~ side motion as the wheels touch.
18. Have the vertical descent stopped when the wheels touch the runway by:
  - a. Leveling Off
  - b. Use of throttles
  - c. Combination of both
19. Upon touching the wheels on the runway give slight forward pressure on the wheel column. The elevator is already trimmed mechanically to hold the tail up; the nose down.
20. If the airplane bounces badly:
  - a. Apply throttles
  - b. Simultaneously push the nose down
  - c. Level off and execute another landing if sufficient runway if left.
21. As the wheels touch the runway fully retard the throttles.
22. Keep ship ~~straight~~ with rudder while adequate control is present.
23. Pull the tail ~~after~~ after flying speed has been lost.
24. As airplane slows down:
  - a. Be ready with rudder control
  - b. Be ready with the brakes if rudder control is not sufficient.  
That is the most critical period for ground-loops because of:
    - (1) Lack of effective rudder control
    - (2) Numerous eddies and trubulent air are built up by flaps and large angle of the wing. These uneven air pressures strike the rudder and rudder stabilizer and cause the airplane to swerve.
25. Taxi to the end of the runway.
26. Unlock tail-wheel.
  - a. If tail wheel fails to unlock:
    - (1) Kick opposite rudder
    - (2) Apply opposite brake
    - (3) Turn in desired direction
27. Check cockpit after clearing the runway
  - a. Props full high RPM
  - b. Flaps started up
  - c. Elevator tab adjusted (neutral)
28. Taxi back for take-off or taxi into the line
29. Turn off the engines by check list
  - a. *...*



- a. Stopping
    - (1) Before the engine is stopped, place propeller control in POSITIVE HIGH PITCH POSITION and run engine at 1200 RPM until blades have shifted; idle until the engine has cooled appreciably below cruising temperature.
    - (2) Throttles to FULL IDLE (Back) position.
    - (3) Mixture control levers to LEAN position.
    - (4) Turn ignition switches to OFF after the engine ceases firing.
    - (5) Turn master switch OFF.
30. Call the tower by form: CALL  
"Switches Off"
- a. "Army 2214 on the ramp, go ahead"
  - b. "Army 2214 from five (5) G.B. Roger"
31. Fill out Form 1 and sign Form 1A

f. EMERGENCIES

1. Single engine operation:
  - a. Get sufficient airspeed for single engine operation.
  - b. Simultaneously hit the good throttles and the rudder opposite the bad engine
  - c. Push prop pitch and throttle of good engine forward necessary amount to maintain air speed and altitude.
  - d. Pull prop pitch control back, Full High Pitch
  - e. Turn the engine selector valve from "Both" to the good engine (Simulate)
  - f. Turn the cross-feed valve to "Off" (Simulate)
  - g. Trim airplane to fly straight and level
2. Emergency Wheel Procedure:
  - a. Check fuse in fuse box for burned out Landing Gear Fuse.
  - b. Place Landing Gear Switch in Neutral or (Off) position.
  - c. Take crank from clip on floor under pilot's seat and insert into socket on right side of pilot's seat.
  - d. Look at plate on floor by crank socket and be sure you crank wheels in the proper direction.
  - e. Turn crank in the forward direction (to lower) two or three turns, then remove and try Landing Gear Switch in the DOWN position again.
  - f. If this fails to lower the wheels, return switch to Neutral (Off) position and crank down manually with Hand Crank. (Takes approximately 191 complete turns).
3. Emergency Exit:
  - a. Know the operation of the emergency exit handle, door cannot be conventionally opened in flight.
4. Radio Coils:
  - a. Know how to change the radio coils.

SPECIAL INSTRUCTIONS

a. Flying Limitations

1. Maneuvers Prohibited

- (1) Normal operation of this class of airplane does not include maneuvers such as spins, loops, rolls, Immelman turns, inverted flight, etc.

2. Other Restrictions

- (1) Do not exceed and indicated airspeed of 180 MPH
- (2) Do not begin to lower flaps at indicated airspeeds in excess



- (2) Do not begin to lower flaps at indicated airspeeds in excess of 108 MPH.
- (3) Do not begin to lower landing gear at indicated air speeds in excess of 120 MPH.
  - (4) Do not lower landing lights at indicated air speeds in excess of 120 MPH.
  - (5) Do not exceed an engine speed of 2200 RPM for normal operation or take-off.
  - (6) Maximum diving RPM, 2300 revolutions.

b. Landing Gear and Flaps

1. Before starting engine, taxiing or landing, be sure the landing gear switch is in the full down position. (Both the Autosyn Indicator and the landing gear warning horn should indicate improper position of the gear).
2. Avoid unnecessary landings and excessive use of brakes when loaded in excess of normal gross weight.

c. Gyros

- a. Uncage gyros while engines are running.
- b. Cage gyros while engines are not running.

d. Energy Supply for Instrument Operation

1. Altimeter: Operates from static pressure only (Supplied from the Pitot tube)
2. Vertical Speed: Operates from static pressure only (Supplied from the Pitot Tube)
3. Air Speed: Operates from static pressure and pitot pressure (Both sources deriving from the two separate chambers of the Pitot Tube).
4. Turn and Bank: Operates from a vacuum of two inches of mercury. (Supplied from the engine driven vacuum pumps).
5. Directional Gyro: Operates from a vacuum of three and one-half to four inches of mercury. (From Vac. Pumps)
6. Gyro Horizon: Operates from a vacuum of three and one-half to four inches of mercury (Source-Vac. Pumps)
7. Magnetic Compass: Operates due to the force of the earth's magnetic field.
8. Static Pressure: The true pressure of free air at any given place.
9. Pitot Pressure: The pressure in an open tube pointing in the direction of the aircraft's line of flight.
10. Inches of Mercury: Unit of vacuum measurement. One inch of Mercury is the pressure that will support a column of mercury to the height of one (1) inch.
  - a. Vacuum pump
  - b. Carburetor venturi.



PRELIMINARY OPERATION INST.

ENGINE: Two Jacobs R-755-9. Rated 225 H.P. at 2100 R.P.M. at Sea Level; 245 H.P. at 2200 R.P.M. for take-off.

SUPERCHARGER: 1:1

INSTRUMENTS: Oil Pressure: Maximum 90 lbs./sq. in.--Desired 70 to 90 lbs./sq. in.--Minimum 60 lbs./sq. in.  
Oil Temperature: Range 40° to 80°C.

Fuel Pressure: Maximum operating range  $3 \frac{1}{4}$  to  $3 \frac{1}{2}$  lbs./sq.in. (will operate on pressure as low as 2 lbs/sq. in.)

Cylinder Head Temperature: Maximum take-off (time not to exceed five (5) minutes) 205°C.--Desired 150° to 205°C.--Minimum operation 150°C.

Manifold Pressure: Take-off maximum (not to exceed five minutes) 25-27" Hg.; Cruising maximum 23" Hg.; Cruising Desired 19 to 20" Hg.

ENGINE OPERATION LIMITS: Take-Off (not to exceed five minutes)  
Maximum 2200 R.P.M.  
Climb and High Speed Maximum 2200 R.P.M.  
Cruising 1900 R.P.M. to 2000 R.P.M.

FUEL: Capacity total 120 gals..  
Consumption (For EACH ENGINE): Cruising Maximum 17.5 gals. per engine per hour at approximately 2000 R.P.M.;  
Cruising Desired 14.2 to 13.9 gals/eng/hr.  
Specification: Fuel Aircraft engine, grade 73 Octane rating.

OIL: Capacity total 10 gals..  
Consumption: Maximum allowable for Cruising 2.8 qts./hr./eng.

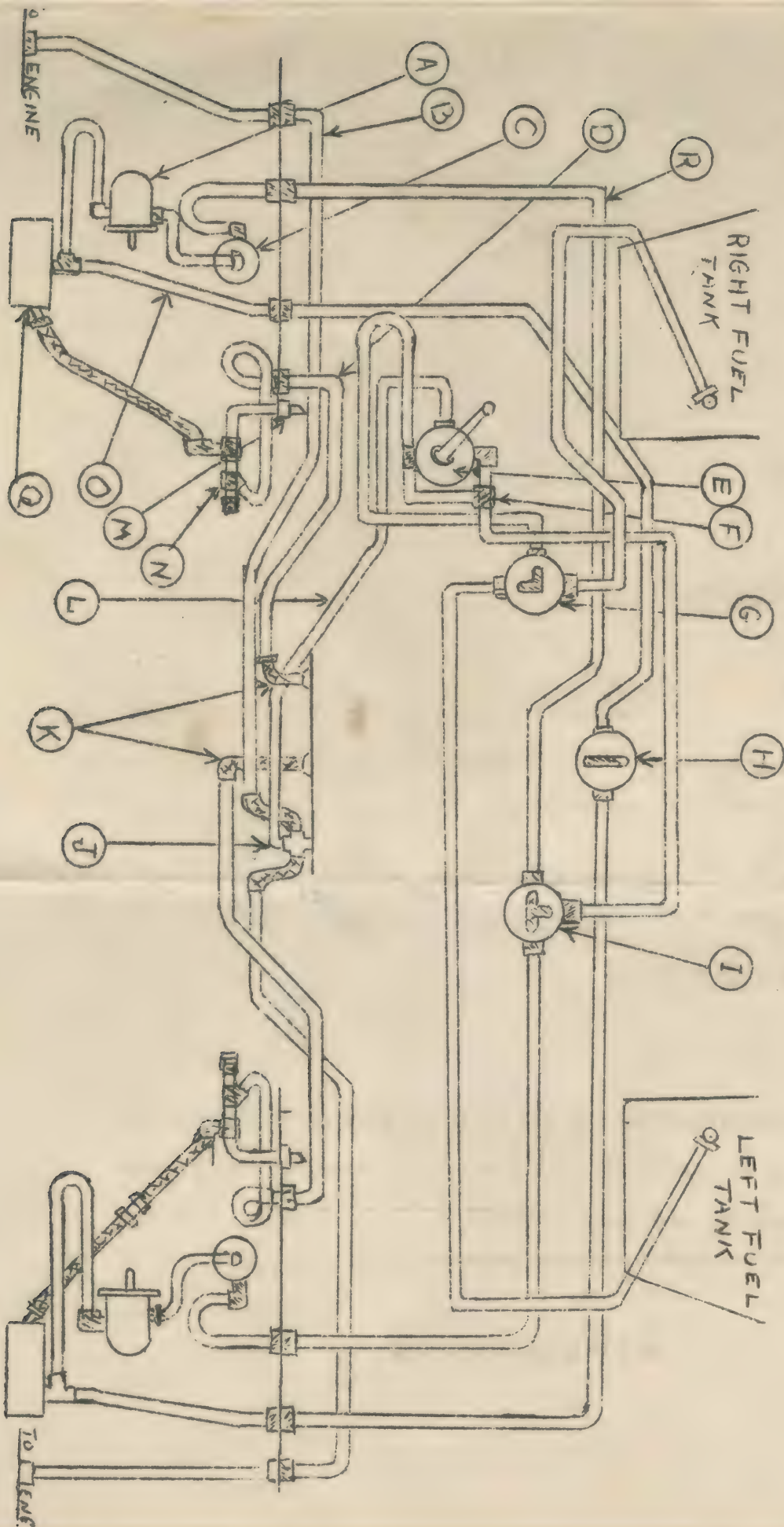
PROPELLERS: Two Hamilton Standard Constant Speed Props. Diameter 7'9".

MIXTURE CONTROL: Below 3500 feet-"Full Rich" to "Smooth Operation".  
Above 3500 feet-"Richest Smooth Operation" to "Best Power". Reference T.O. No. 03-106-1.

CARBURETOR AIR HEATER CONTROL: For start and in general run COLD.  
Under icing conditions use sufficient heat to prevent carburetor icing.  
Reference T.O. No. 02-1-5.



- A. FUEL PUMP
- B. PRIMER LINE TO ENGINE
- C. STRAINER
- D. FUEL PRESSURE LINE
- E. MOBILE PUMP
- F. PRESSURE RELIEF VALVE
- G. FUEL TANK SELECTOR VALVE SHOWN WITH LEFT TANK "ON"
- H. CROSS FEED VALVE SHOWN "OFF"
- I. ENGINE SELECTOR VALVE SHOWN WITH BOTH ENGINES "ON"
- J. PRIMER UNIT
- K. FUEL PRESSURE GAGE
- L. PRIMER LINE FROM PUMP
- M. FUEL PRESSURE SIGNAL SWITCH
- N. OIL DILUTION AND FUEL PRESSURE FITTING
- O. CROSS FEED LINE
- P. CARBURETOR
- Q. MASTER PRIMER NITRILE
- R. FUEL SUPPLY LINE





C E R T I F I C A T E

Aviation Cadet \_\_\_\_\_

has this date, \_\_\_\_\_, completed the manual on the  
AT-17 Type airplane. He knows the normal operation of each  
component part of this airplane and the essential emergency procedures.

\_\_\_\_\_  
Ground School Instructor.

Aviation Cadet \_\_\_\_\_

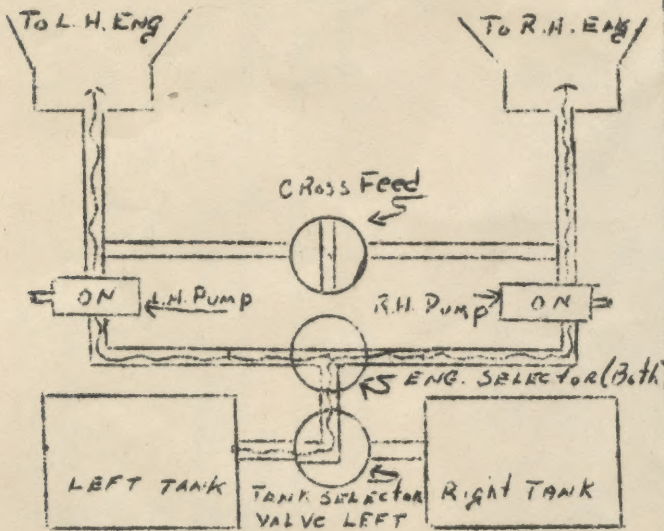
has this date, \_\_\_\_\_, demonstrated a satisfactory  
flying ability in the AT-17 Type airplane.

\_\_\_\_\_  
Flying Instructor

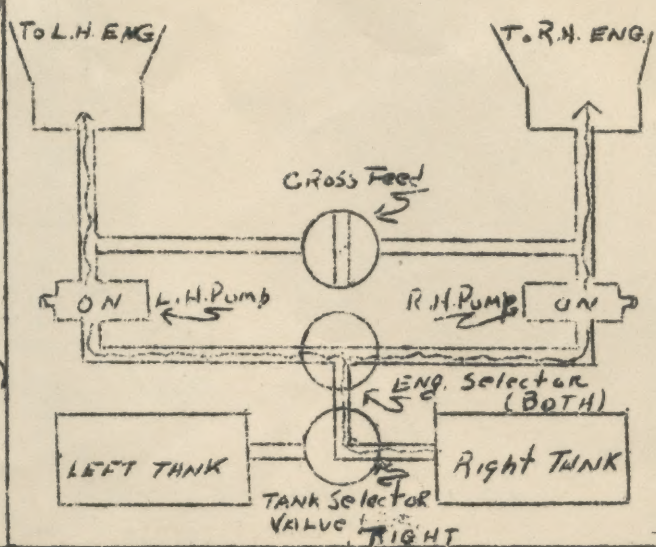


SIMPLIFIED FUEL SYSTEM DIAGRAM\*--SHOWING VARIOUS OPERATING CONDITIONS.

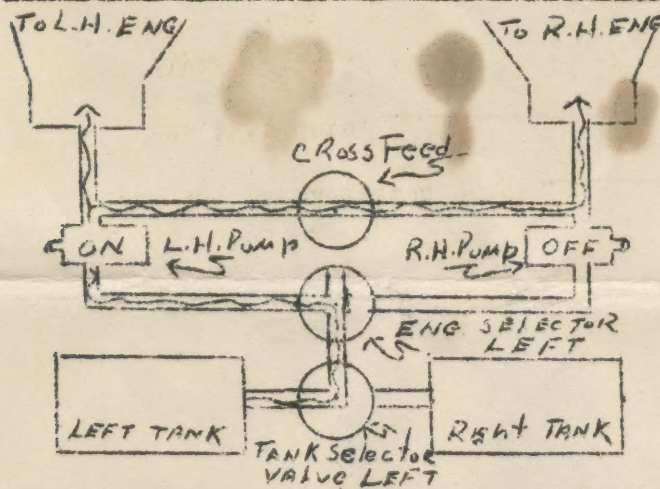
NORMAL OPERATION FROM THE L.H. TANK  
(Both Fuel Pumps operative)



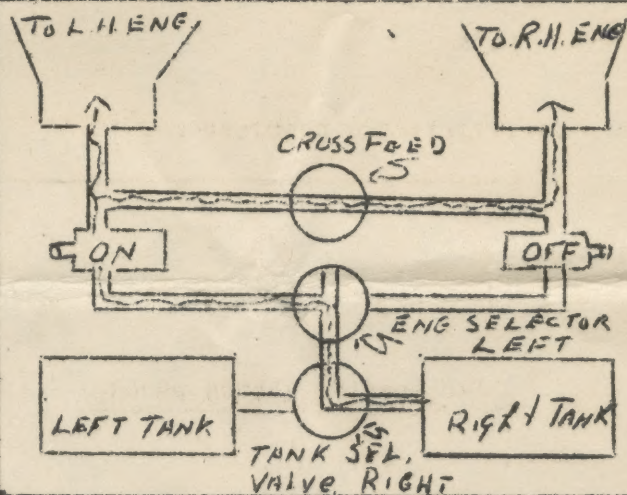
NORMAL OPERATION FROM THE R.H. TANK  
(Both Fuel Pumps Operative)



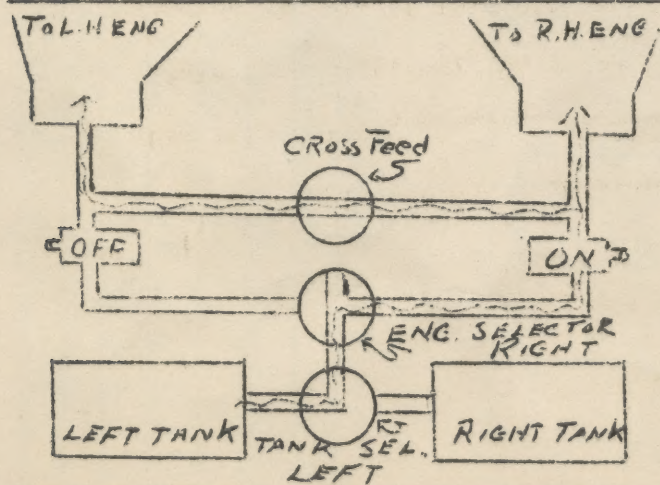
OPERATION FROM L. H. TANK  
(Right Hand Pump Inoperative)



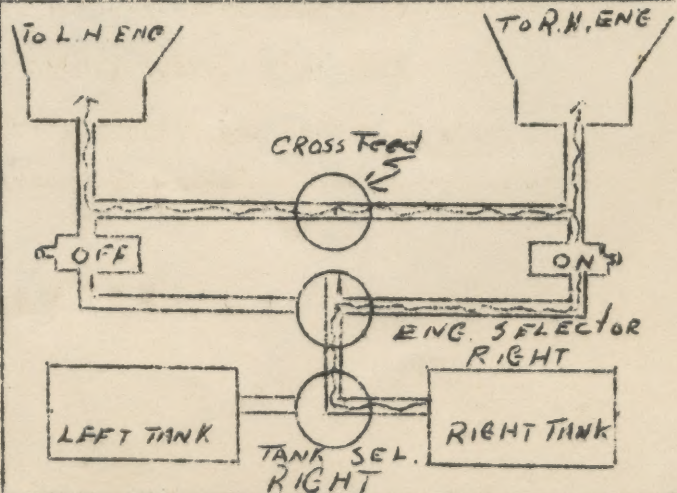
OPERATION FROM R.H. TANK  
(Right Hand Pump Inoperative)



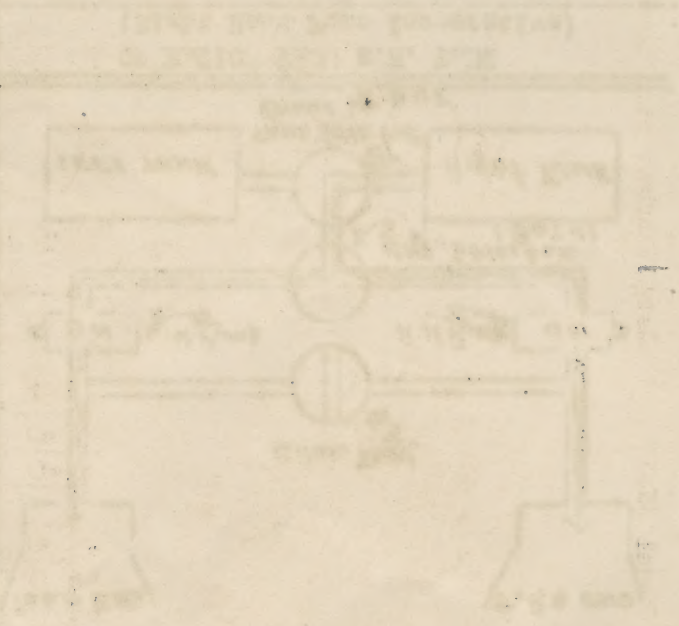
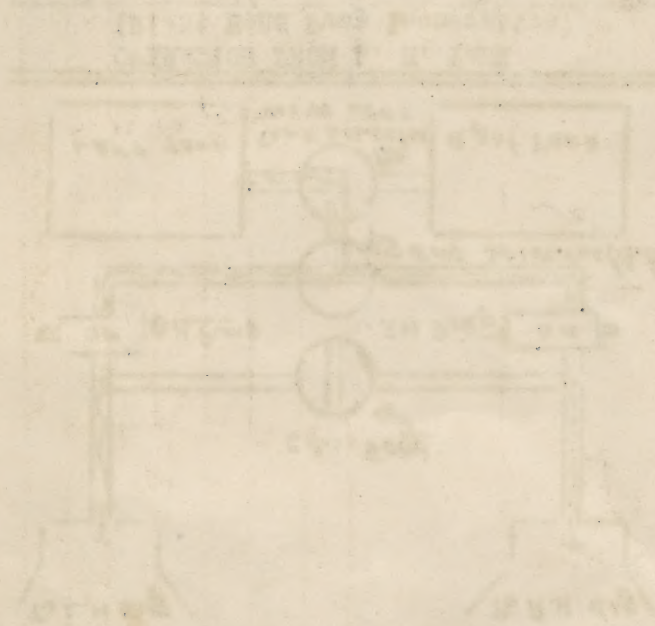
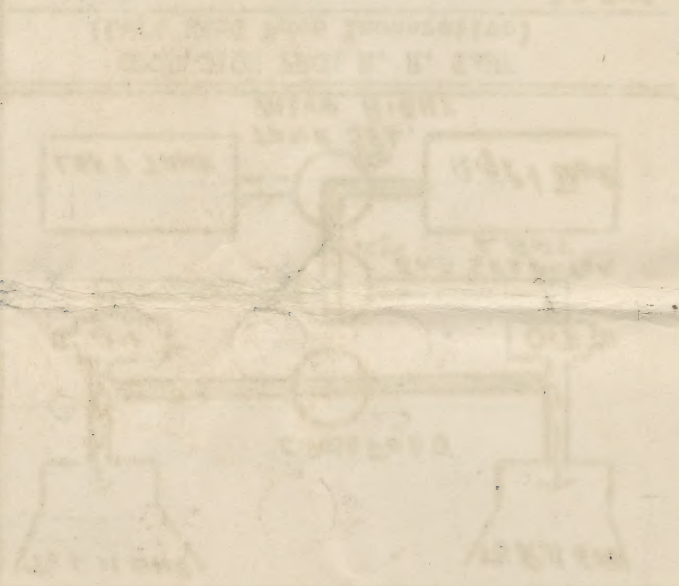
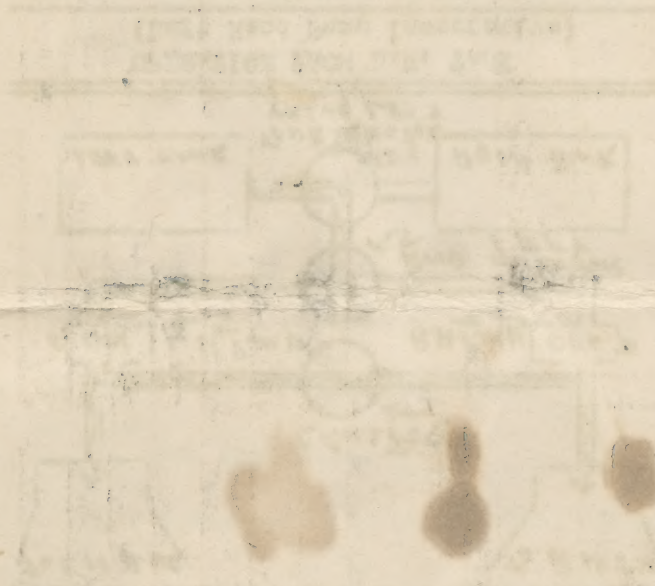
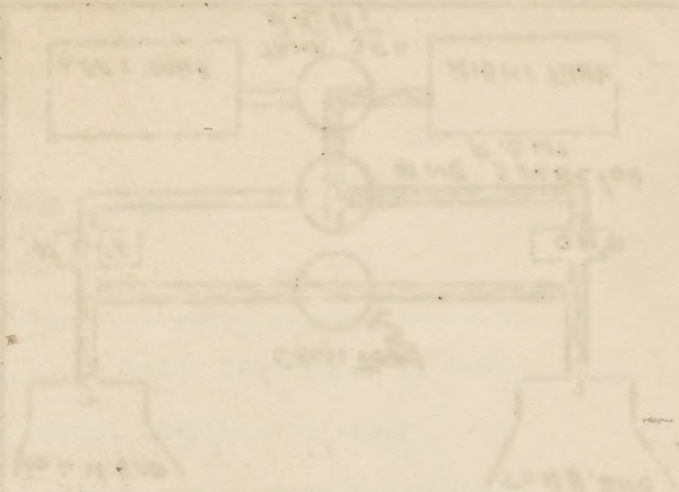
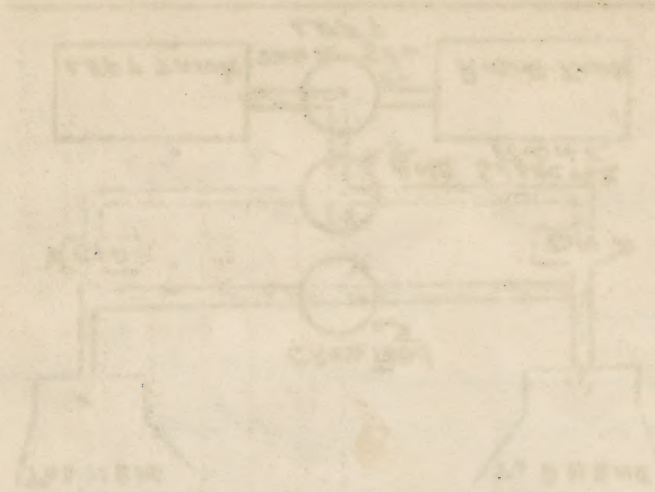
OPERATION FROM L.H. TANK  
(Left Hand Pump Inoperative)



OPERATION FROM R. H. TANK  
(Left Hand Pump Inoperative)







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Handwritten text at the bottom right of the page, possibly a title or description of the diagrams.







Handwritten text in a vertical column on the left margin, likely a title or chapter heading.



Multiple columns of handwritten text on the right side of the page, arranged in a structured manner. The text is written in a traditional Chinese script, likely representing a list, a table, or a detailed description corresponding to the diagram on the left. The text is somewhat faded and there are some ink blots or stains visible.